ROBOT-BASED AUTOMATION SYSTEM FOR CRYOGENIC CRYSTAL SAMPLE MOUNTING

Abstract of the Disclosure

A method and robot-based automation system are provided for cryogenic crystal sample mounting, for example, for use for cryogenic crystal sample mounting in the x-ray crystallography station at an x-ray source. The system includes a robot arm carrying a handset. The handset includes a pair of elongated fingers for sample mounting, and each finger carrying a set of strain gauge arrays for providing force sensing. A slim finger design allows a sample mounting process with no interference with the beam stop, cryostreem and x-ray detectors. The handset can detect the contact force intensity and direction; provide a precise gripping action; and feel the results of the gripping. The finger design incorporates a mechanism to maintain the sample temperature well below the cryogenic safety margin for the crystal viability. A Dewar container is provided with an ice control system and liquid nitrogen flow control. A triangular sample magazine maximizes the Dewar space usage. A miniature kinematical mounting sample holder provides near micron positioning repeatability. These capabilities make the robot-arm more powerful, flexible, and reliable.